

Finger Lakes LPG Storage, LLC

Finger Lakes LPG Storage Facility  
Reading, New York

Response to DEC August 12, 2010 Second Notice of  
Incomplete Application

Filed: September 28, 2010

**Response of Finger Lakes LPG Storage, LLC to DEC's August 12, 2010  
Second Notice of Incomplete Application ("NOIA")**

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**DEC Map Comments**

The following issues remain and must be addressed concerning Finger Lakes' Exhibit 2 "Finger Lakes LPG Storage Gallery Map" and related topics:

**DEC Comment 1.** Please label "Finger Lakes Gallery 1" and "Finger Lakes Gallery 2" on the gallery map.

***Finger Lakes Response:** Finger Lakes' Gallery Map has been revised and now labels each Gallery. The revised Gallery Map is attached to this Response as **Exhibit A**.*

**DEC Comment 2.** Please add and show the cavern outline from the most recent sonar (i.e., October 2009) of Well No. 58 (Gallery 2) on the gallery map.

***Finger Lakes Response:** The cavern outline of well 58 (Gallery 2) that is shown on the revised Gallery Map does reflect the most recent sonar.*

**DEC Comment 3.** If the purple outlines (Max Gallery Outline) of the caverns forming Gallery 1 also represent the current outlines of the gallery, they should be identified on the map as such on the gallery map.

***Finger Lakes Response:** This has been corrected in the notes on the Gallery Map under Brinefield Color Code which states for the purple line "Current and Maximum Gallery Outline." This applies to both Gallery 1 and Gallery 2.*

**DEC Comment 4.** The data table on the left side of the gallery map should be updated to reflect current information for Well Nos. 34 & 58.

***Finger Lakes Response:** The data table on the left side of the Gallery Map has been updated.*

**DEC Comment 5.** The "Brinefield Color Code" on the gallery map shows a "red" cross for the "Top of Cavern" but this symbol is not used on the map, please correct color code or the map itself.

***Finger Lakes Response:** The Brinefield Color Code on the map has been revised to show a blue crossed circle for top of well head and this is shown on the map for the active wells. The red cross has been replaced and is no longer shown on the map. Where the top of cavern is in a different location from the top well head, this is shown with a blue cross symbol.*

**DEC Comment 6.** For all wells on the gallery map, please include a legend which explains the different symbols used to show well status.

**Finger Lakes Response:** *The Brinefield Color Code legend has been revised to coordinate with the symbols used for each of the wells on the map.*

**DEC Comment 7.** “Well FL1” should be identified as a proposed well on the gallery map.

**Finger Lakes Response:** *The designation of Well FLI has been so revised on the revised Gallery Map.*

**DEC Comment 8.** Explain why two different symbols are used on the gallery map to show the pressure connections between the caverns in Gallery 1 (i.e., between Well Nos. 33 & 43 and Well Nos. 43 & 34/44).

**Finger Lakes Response:** *The Gallery Map has been revised so that the pressure connection between wells 33 and 43 and between wells 43 and 34/44 are shown by the same dashed purple line.*

**DEC Comment 9.** Explain why the revised gallery map shows the pillar width between Gallery 1 and International Gallery 10 more than doubled (increased from approximately 70’ to 165.9’) compared to the plan view map previously provided in the October 13, 2009 application.

**Finger Lakes Response:** *The explanation for the distance difference is that in the original map, the north direction was incorrectly pointed towards the west (upper right corner of the original map) which moved the well orientation more towards the west, therefore closer to well 52. When corrected, it turned the well towards the east which moved it farther from well 52.*

**DEC Comment 9a.** Describe how the outline for Gallery 10 was determined and provide all supporting information. Provide a copy of all sonar surveys and production records for all wells in Gallery 10 as the notation on the map indicates the gallery outline was determined by “Sonar & Production Records.” Additionally, Exhibit C of the May 14, 2010 Response to NOIA should be corrected to include the referenced sonar(s) unless none actually exist. If none exist, correct notation on map.

**Finger Lakes Response:** *As noted in Exhibit C to Finger Lakes May 14, 2010 Response to DEC’s January 11, 2010 Notice of Incomplete Application (“First NOLA”), there are no records for sonars for wells 18, 29 and 57. An incomplete sonar was performed on well 52 in November 2009. This is described in Section 6.4 of the Reservoir Suitability Report and Exhibit 14 submitted on May 14, 2010. Therefore, the gallery map is being revised to show that the shape of Gallery 10 was determined based on a review of production records. In terms of production records, we have been able to obtain the following information.*

*Well 18 was drilled in 1936 and a deep well pump was utilized to extract brine from this well until it was abandoned in 1942. The well was plugged and*

abandoned in 1977 and a Notice of Intention to Plug and Abandon and Plugging Report are attached as **Exhibit B**. We have no production records for well 18.

Well 52 was drilled in 1972 and, along with well 57 (which was drilled in 1977), were operated as active brine injection and withdrawal wells until 1996 when both were plugged in June 1996 (with a nearly identical total depth of 2770/2782' and with a cement plug at 2214/2216'). We have only been able to find production reports from 1984 to 1996<sup>1</sup>. These reports reveal the following:

Year	Well	Activity
1984	52	[REDACTED] (water injected)
	57	[REDACTED] (brine withdrawn)
1986	52	[REDACTED] (brine withdrawn)
	57	[REDACTED] (water injected)
1987	52	[REDACTED] (brine withdrawn)
	57	[REDACTED] (water injected)
1988	52	[REDACTED] (brine withdrawn)
	57	[REDACTED] (water injected)
1989	52	[REDACTED] (brine withdrawn)
	57	[REDACTED] (water injected)
1990	52	[REDACTED] (brine withdrawn)
	57	[REDACTED] (water injected)
1991	52	[REDACTED] (brine withdrawn)
	57	[REDACTED] (water injected)
1992	52	[REDACTED] (brine withdrawn)
	57	[REDACTED] (water injected)
1993	52	[REDACTED] (brine withdrawn)

<sup>1</sup> We have been unable to locate records for 1985. These production reports are also included with **Exhibit B**.

<sup>2</sup> Reported as [REDACTED] barrels but converted to gallons for review consistency.



	57	[REDACTED] (water injected)
1994 <sup>3</sup>	52	[REDACTED] (brine withdrawn)
	57	[REDACTED] (water injected)
1995	52	[REDACTED] (brine withdrawn)
	57	[REDACTED] (water injected)
1996 <sup>4</sup>	52	[REDACTED] (brine withdrawn)
	57	[REDACTED] (water injected)

We have evaluated the basis for the shape of Gallery 10 on the gallery map. We have talked with Larry Sevenker, who has provided consulting services over the years to US Salt's predecessors during the time these production activities have occurred, Thomas Eyermann, a former (now retired) Brinefield Superintendent for International Salt Company, John Istvan with International Gas Consultants, Barry Moon with Inergy Midstream, and Dave Crea, an engineer with US Salt. Based on this review and evaluation, it is believed that the shape on the gallery map is based on these production records (since as noted above, a complete sonar for any of the Gallery 10 wells has not been performed).

**DEC Comment 9b.** Page 9 of the May 14, 2010 Reservoir Suitability Report states "there was no pressure encountered on well 52..." In other parts of the application (i.e., Gallery 1 & Gallery 2), Finger Lakes says that encountered pressure during well re-entry is an indication of tightness for the proposed storage galleries. Conversely, is "no pressure encountered" an indicator of Gallery 10 not being tight?

**Finger Lakes Response:** *It is assumed that the cavern does leak and will be monitored as explained in response to DEC Comment 9d below.*

**DEC Comment 9c.** Finger Lakes indicates that it could not obtain a cavern sonar survey on Well No. 52 because the casing extending through the cavern is surrounded by cement. Was any consideration given to cutting the casing and attempting to re-sonar? If "no," why not? If dropping the casing in Well No. 52 and re-sonaring is not doable, has Finger Lakes considered re-entering another well in the gallery (i.e., 18 or 57) to perform a sonar survey? Based on information supplied thus far by Finger Lakes, it appears there is still some uncertainty with regard to the actual pillar width between proposed storage

<sup>3</sup> We believe the brine withdrawn and injected volumes were inadvertently transposed in the 1994 annual production report.

<sup>4</sup> Wells 52 and 57 were only used in 1996 until February 12, 1996 and they were then plugged in June 1996.

Gallery 1 and Gallery 10. The Department is aware that Finger Lakes' parent Inergy Midstream, LLC applied for and received well re-entry permits for Well Nos. 18 & 57 in January 2010 but let the wells permits recently expire before commencing work. What was the reasoning for obtaining the permits but not using them?

***Finger Lakes Response:** When drilling out well 52, Inergy did not get to where the last top of cavern was reported. Inergy drilled into rubble three feet above where the last top of cavern was believed to be located and concluded that the last cavern height of 34 feet was filled with rubble. When the sonar was attempted it was determined that there is no cavern behind the casing down to the logged depth of 2,680 feet outside of the cemented production casing. Cutting the casing was considered but since we were above the last known top of cavern, and the last known cavern height was 34 feet, there was not enough cavern height for the casing to fall away and there may not be any cavern space. Inergy's reason for obtaining the drilling permits for wells 18 and 57 was to use the gallery for future use.*

The Cement Bond Log ("CBL") of well 52, logged 11-14-2009, shows Gamma Ray responses from the formation all the way to total depth of logging tools at 2,636 feet. Since the CBL shows [REDACTED]

[REDACTED] there is [REDACTED]. The Tully, Marcellus and other formations above the salt are easily identified. Since the existing bottom of adjacent well 44 in proposed FL Gallery 1 is [REDACTED] and the [REDACTED] the distance from [REDACTED] between [REDACTED] is slightly increased and adds to the conclusion that [REDACTED] has been developed [REDACTED] cavern. In addition, [REDACTED] had a [REDACTED] that caused the [REDACTED]

The fact that the recent sonar showed no cavern behind the entire length of the cemented casing provides credibility to the above conclusions.

With regard to well 18, Tom Eyermann said that an attempt was made to clean out well 18 to 2,494 feet (assume that was the original total depth). While washing down, circulation was lost at 1,765 feet. He further stated that the tools acted like they were in rubble at 2047 feet, well above the proposed storage interval in Gallery 1. He said it was never fracture connected with 52 and 57 before it was plugged in 1977.

As now illustrated in revised vertical cross-section B-B, the [REDACTED] was at the [REDACTED] and either through open borehole or through a notch in each well or perforations in the [REDACTED]. Based on the production records, the cavern is likely no more than [REDACTED]. That translates into [REDACTED] with only [REDACTED]

*As noted in the response to DEC Comment 9a above, the shape of Gallery 10 is based on production records, which Finger Lakes' experts (John Istvan, Barry Moon, Larry Sevenker and Dave Crea) have reviewed and conclude supports the distance shown on the gallery map between Finger Lakes Gallery 1 and International Gallery 10 (i.e., 165.9').*

**DEC Comment 9d.** The Department understands that Finger Lakes re-entered Well No. 52 to evaluate the well and cavern, and ran a directional survey, bond log, casing inspection log and a sonar survey. Because of the relative closeness of proposed storage Gallery 1 and Gallery 10, and perceived uncertainty of the actual pillar width between Galleries 1 & 10 (see Exhibit 20, Item 6 of "Section 6. Conclusions and Recommendations"), provided Well No. 52 is properly constructed, has Finger Lakes considered running a long-term brine pressure test on Gallery 10 and MIT on the Well No. 52, and then converting Well No. 52 for monitoring use of Gallery 1 storage operations? Ensuring LPG containment in Gallery 10, if inadvertently connected to Gallery 1, should be considered and pros/cons of such evaluated by Finger Lakes.

***Finger Lakes Response:** The Reservoir Suitability Report notes that for the most part well 44 (the closest to Gallery 10) will be used as a monitoring well (and only for brine movement out as necessary). During operation of Gallery 1, Finger Lakes also proposes to utilize a digital pressure recorder on well 52 that will be linked to Finger Lakes' control room and SCADA system to ensure that pressures in both Gallery 1 and 10 are monitored to ensure that in the unlikely event there is some potential communication between the two galleries, actions can be implemented to ensure product is not allowed to enter Gallery 10 which may not be tight.*

**DEC Comment 9e.** Additionally, the Finite Element Analysis ("FEA") included as Exhibit 20 with Finger Lakes May 14, 2010 Reservoir Suitability Report discusses the effect of the relatively small pillar between the galleries, and states "This implies some micro-cracks and fissures might have been induced in the pillars during the brine storage. This is due to the relatively large 34/44 LPG gallery compared to small cavern spacing of 166 ft." and "Certain conservative assumptions were made relating to pressure, location and the size of the cavern associated with Gallery 10. Inability to access the gallery for sonar due to well conditions necessitated the use of these worst case assumptions." It is unclear what conservative worst-case assumptions were made in the FEA relative to the location and size of the adjacent cavern (Gallery 10) – please elaborate.

***Finger Lakes Response:** The FEA has been revised as requested by adding modeling with regard to Cavern 2 (well 58), an explanation of the conservative assumptions incorporated into the FEA (pp. 11 and 14) and a subsidence simulation (Section 6 and Figures 20-26) model. See Exhibit C.*

## **DEC Comments on Reservoir Suitability Report**

The following issues remain and must be addressed concerning Finger Lakes' Finite Element Analysis ("FEA"):

**DEC Comment 1.** The FEA (Exhibit 20) entitled "Finite Element Analysis on 33/44 Gallery, Gallery 10 and Caverns 33 and 34 of Finger Lakes LPG Storage, LLC" does not address the proposed storage of LPG in Gallery 2 (Well No. 58). It does not include modeling and analysis of Gallery 2. In support of its application and as previously requested, Finger Lakes must specifically model proposed LPG storage (including MIT) in Gallery 2 and provide the analysis and conclusions to the Department.

***Finger Lakes Response:** The FEA has been revised as requested by adding modeling with regard to Cavern 2 (well 58), an explanation of the conservative assumptions incorporated into the FEA (pp. 11 and 14) and a subsidence simulation (Section 6 and Figures 20-26) model. See **Exhibit C**.*

**DEC Comment 2.** The FEA (Exhibit 20) does not include a prediction of ultimate subsidence at proposed LPG storage Gallery 2 (Well No. 58). In support of its application and as previously requested, Finger Lakes must provide a prediction of ultimate subsidence at Gallery 2.

***Finger Lakes Response:** US Salt has been reporting on potential subsidence at well 58 in reports it has submitted to DEC and there has been no evidence of subsidence during the time it has been monitored. As part of Arlington Storage Company's Modification Permit Application for Seneca Storage Gallery 2, it has proposed a subsidence monitoring program. In addition, the FEA has been revised as requested by adding modeling with regard to Cavern 2 (well 58), an explanation of the conservative assumptions incorporated into the FEA (pp. 11 and 14) and a subsidence simulation (Section 6 and Figures 20-26) model. See **Exhibit C**.*

**DEC Comment 3.** The FEA (Exhibit 20) was performed for a 50-year facility life for the storage of LPG in Gallery 1. If and when issued, please note that the storage permit will be conditioned to expire in 50 years unless Finger Lakes supports a longer facility life.

***Finger Lakes Response:** Comment noted.*

## **DEC Comments on Cross-Sections**

Geologic cross-sections of the area shown on the map listed in item 5 showing lithologies, storage wells (including casing strings and setting depths) and overlying and underlying formations, and vertical profiles of the existing and ultimate caverns including all prior sonar surveys. These cross-sections must also depict any faults or other structural or stratigraphic features that affect either continuity and extent of the formations shown or effectiveness of containment of gas in the storage reservoir.



The following issues remain and must be addressed concerning Finger Lakes' cross-sections:

**DEC Comment 1.** For Exhibit 17 "Vertical Section B-B' (South-North) Well Caverns 31, 33, 43, 34, 44, 52 and 57, "no pressure connections are shown in Gallery 1 (i.e., between Well Nos. 33 & 43 and Well Nos. 43 & 34/44) – please include and show the inter-cavern pressure connections on the cross-section (i.e., which correspond to those shown on the plan view).

***Finger Lakes Response:** Vertical Section B-B' has been revised to illustrate the inter-cavern pressure connections. The revised Section is attached as **Exhibit D**.*

**DEC Comment 2.** Gallery 10 cavern outline(s) must be added to Exhibit 17 "Vertical Section B-B' (South-North) Well Caverns 31, 33, 43, 34, 44, 52 and 57" – please include and show the cavern outline on the cross-section (i.e., which corresponds to that shown on the plan view).

***Finger Lakes Response:** See **Exhibit D**, provided in response to comment 1 above.*

**DEC Comment 3.** Also, on the same cross-section mentioned above, is the cavern outline identified by "Well 43 1976 Sonar" open cavern space or rubble filled? Is this space currently accessible? Is this space accounted for in the estimated 5 million barrels of water-filled capacity? It is unclear due to the continuous shale layer above it and minimal caving of the roof represented on the cross-section.

***Finger Lakes Response:** At the time the sonar on well 43 was performed in 1976, there was an open space cavern and that is what is depicted on the cross-section. Subsequent sonars performed on well 43 occurred in 1979, 1997, 1999, 2001, 2002, 2004 and most recently in 2009. Our records indicate that well 43 was drilled in 1966 and plugged and abandoned in 2004. From 1966 until 1987, well 43 was used as a tubing injection well. From 1987 until 2004, well 43 was used as an observation well. Sonars performed after 1976 did not pick up the open space observed at that time, most likely because the original cavern became filled with rubble. The cavern observed in 1976 is not included in the total estimated 5 million barrels of water-filled capacity for Gallery 1.*

**DEC Comment 4.** For Exhibit 17 "Finger Lakes LPG Storage, LLC Structural Cross Section A-A'" and "Finger Lakes LPG Storage, LLC Structural Cross Section B-B'," there appears to be a typo in that the line designations "A-A'" and "B-B'" in the title block and labels next to the well logs are swapped and do not correspond to the correct lines. If you concur, please correct and resubmit.

***Finger Lakes Response:** The structural cross-sections have been corrected to correctly correspond with the gallery map. The revised cross-sections are attached as **Exhibit E**.*

## **DEC Comments on Cavern Development Plan/Proposed Operations**

The following items remain and must be addressed concerning Finger Lakes' Cavern Development Plan and Proposed Operations:

**DEC Comment 1.** Finger Lakes must elaborate and explain its cavern development plan and proposed operations in more precise terms, including the following:

**DEC Comment 1a.** Finger Lakes must explain and identify what areas of the proposed storage galleries will remain as currently constructed and what areas of the galleries will be subject to operational solutioning (i.e., less than 2% annual growth) during the proposed LPG storage operations. It is understood that no active mining will take place once the storage caverns are put into service. Finger Lakes must identify on a plan view and vertical section the 1) areas of the galleries that account for the projected 30% cavern growth during LPG operations and 2) areas of the galleries that will not be affected (i.e., no growth) by LPG storage operations.

***Finger Lakes Response:** The plan view on the Gallery Map (as revised) shows that the present outlines will not be enlarged after the 30% growth rate takes place (at least without a further modification to the permit). The cross-sections also show the manner in which cavern growth will occur and how this will not affect pillar distance between Gallery 1 and International Gallery 10.*

**DEC Comment 1b.** Finger Lakes must explain how it intends to prevent operational solutioning certain areas of the storage galleries. An explanation by Finger Lakes that certain wells will be used only for monitoring is not sufficient as it does not explain why cavern space being used for LPG storage does not grow laterally due to operational solutioning. It is unclear from Finger Lakes application how lateral growth of the galleries will be prevented. Finger Lakes must describe any controls, including operational, that will be used to prevent gallery growth including lateral growth.

***Finger Lakes Response:** Finger Lakes has submitted an application to drill a new well into gallery 1 (Proposed FL1) for the main purpose of product injection/ withdrawn of LPG and with the use of a hanging tubing string in the well for brine injection and withdrawal during injection of LPG.*

*Well 43 will be used for LPG withdrawal. It is located at the highest point of the cavern, so if LPG does flow to well 43 from well 34 and 44 (also proposed FL1 well) it can be recovered. The tubing depth in the proposed FL1 well will be below the bottom of cavern in well 43 so it will be possible for LPG to get to well 43 if there is a connection in the rubble pile close to the bottom.*

*Well 44 has a new cemented string to the bottom of the well. Finger Lakes has proposed that this well will be for monitoring and for brine withdrawal if necessary. No saturated or under saturated brine will be injected into this well to*

*prevent the solution mining of this area. As noted, it may be used for brine withdrawal if needed to lower the injection pressure if we are using additional pumps to get the desired flow rates needed.*

*Well 34 will be plugged and abandoned since it has a small casing size and is not in the high point of the cavern.*

*FL 1 well will be used for all brine injection; this will restrict the cavern growth laterally since it is in the wide point of the cavern and the brine will be moving upward during product withdrawal and therefore the growth will occur upward instead of outward.*

*Well 33 has new casing cemented into the surface with a new hanging tubing string. This location in the cavern is the greatest distance from well 44 but does have communication with well 43, 34, 44 and proposed FL 1 which is in the rubble pile. The cavern formed by well 33 will in some respects be operated as a separate cavern since when product is injected, brine will be displaced out of the hanging string in the same well 33. Cavern growth will occur upward primarily due to the insoluble layer in the middle of the cavern.*

*Well 58 is a single well which has a new hanging tubing string installed. It will be operated in the same manner as well 33. Product will be injected/ withdrawn in the annulus and brine will be displaced/ injected in the tubing. Cavern growth will occur upward and outward. Cavern growth will occur above the maximum diameter since the tubing is above the maximum diameter on wells 33 and 58.*

**DEC Comment 1c.** Finger Lakes must describe any controls, including operational, it will use to protect the cavern roofs and limit operational solutioning of the cavern roofs.

***Finger Lakes Response:*** *Finger Lakes will be conducting a brine nitrogen interface test on the wells prior to putting them into LPG service. Finger Lakes will leave enough LPG in the cavern to prevent any solutioning of the cavern roof. This plan is similar to what the Department approved for Cavern 6 at the Savona LPG Facility.*

**DEC Comment 1d.** The maximum requested product fill level must be depicted on a plan view and vertical section of the storage galleries (i.e., show where product will be stored at maximum fill). The setting depth of the brine strings must also be shown on the vertical section. If the setting depth of any brine string will be used to control cavern growth, it should be stated and explained. The Department must understand Finger Lakes cavern development and operations plan. It is acknowledged that Finger Lakes states on page 14 of the May 14, 2010 Revised Reservoir Suitability Report that “Well 33 will not increase in diameter if and when put into LPG storage service since any 30% increase in solutioning by undersaturated brine product displacement will take

place above the existing maximum diameter” and “Wells 43 and 44 will be monitoring wells and will not be solutioned mined...” Nevertheless, Finger Lakes’ current descriptions as noted above and in “Section 11. Cavern Development Plan” lack clarity and do not adequately explain its cavern development and its planned operation of the storage galleries.

***Finger Lakes Response:*** *The maximum requested product fill level for Gallery 1 is now shown on the vertical cross-section and the Gallery Map (Plan View) and the setting depths for the brine strings are shown on the vertical cross-sections. The caverns will not be enlarged after the 30% growth rate takes place without further modification to an underground storage permit. The 30% growth is shown on the plan view and cross-sections as the final estimated cavern shape. Revised vertical cross-section B-B’ is included above in Exhibit D and vertical cross-section A-A’ is included in response to this question as Exhibit F.*

**DEC Comment 2.** Finger Lakes must explain the basis for the “30% additional Mining” noted on Exhibit 21 “Finger Lakes Cavern Matrix.” How was it determined and over what time period does it relate?

***Finger Lakes Response:*** *The FEA modeled operations for 50 years. Finger Lakes decided to limit the cavern growth to only 30% additional growth because that will provide the additional space to accommodate the authorization currently being requested of DEC and to operate the cavern in such a way to minimize cavern growth. In addition, Finger Lakes is going to limit the amount of under saturated brine going back into the cavern thus further slowing the growth. To clarify, the authorization being requested is for the storage caverns to grow by 30%, but product stored shall not exceed a total of 1.5 million barrels in Gallery 1 and 600,000 barrels in Gallery 2. If Finger Lakes wishes to expand the caverns beyond the 30% growth or store more than a total of 2.1 million barrels, it would require a Modification Permit from DEC.*

*Thus, any storage capacity increase that might be requested in the future would require a modification to the permit. At this time, the market and the size of the proposed brine pond only calls for requesting authorization to store 2.1 million barrels of product. Finger Lakes is aware that if there should be market demand for more than this request, it would have to file a Modification Permit Application and provide for additional brine storage. Moreover, Finger Lakes will need to file a Modification to the permit when 30% is being approached but again because of the manner in which undersaturated brine use will be limited, it is likely that a modification to go beyond the 30% cavern growth would not occur for decades, approaching the 50 years modeled in the FEA. The terms of a future Modification will be based on periodic sonar surveys and how the storage caverns actually react to the operational solutioning.*

*Finally, during the injection and withdrawal of product, up to the 30% operational solution mining, the roof will always be protected by leaving some amount of product in the upper portions of the cavern, similar to the product left in cavern 6 at Savona*



With regard to Gallery 2, the additional solution mining currently taking place will increase the cavern size from 512,212 barrels to 730,000 barrels. Inergy estimates that the additional solution mining will be completed by middle of November 2010. There will be additional "operational solutioning" as shown on the "Finger Lakes Cavern Matrix" that has been updated. A revised Cavern Matrix is being provided in response to this comment and Comment 5 below.

Out of the 512,212 barrels of open space shown on the well 58 2009 sonar, [REDACTED]  
[REDACTED]  
Additional solution mining to reach 730,000 barrels was commenced by injecting water at a [REDACTED] [REDACTED] remain to be developed by solution mining to reach 730,000 barrel of cavern size. Total solutioned at that time will be 857,827 barrels ( $512,212 + 345,615 = 857,827$  barrels). [REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]

These numbers are calculated volumes and must be verified by the final sonar survey. At the time of the survey, the depth level of the 600,000 barrels of product can be placed on both the plan view and the cross-section. Until then, those levels cannot be determined. Under no circumstance will the maximum lateral volumes be larger than the lowest sonar developed dimensions and the plan view and cross-section shown now will be the maximum dimensions.

**DEC Comment 3.** Finger Lakes states that Gallery 1's water-filled capacity is approximately 5 million barrels. Why is Finger Lakes requesting limited product storage use of this gallery (i.e., 1.5 million barrels)? If limited use restricted to the top of Gallery 1 relates to controlling lateral cavern growth, it should be stated and explained.

**Finger Lakes Response:** Finger Lakes is requesting authority for a total of 1.5 million barrels in Gallery 1 and 600,000 barrels in Gallery 2 due to siting constraints for brine pond storage and expected market conditions.

**DEC Comment 4.** Finger Lakes states that Gallery 2's water-filled capacity will be approximately 700,000 barrels when storage operations are initiated. Why is Finger Lakes requesting limited product storage use of this gallery (i.e., 600,000 barrels)? Is the remaining water-filled capacity lost in the rubble pile?

**Finger Lakes Response:** While it is possible that some water-filled capacity is lost in the rubble pile, that is not the reason for a request limiting storage use of the gallery to 600,000 barrels. See responses to Comments 2 and 3 above.

**DEC Comment 5.** Exhibit 21 "Finger Lakes Cavern Matrix" must be revised to include a column "Ultimate Capacity" (i.e., water filled) in barrels. With respect to the heading "30% additional Mining," please note that for any solutioning occurring during operation of the LPG galleries (i.e., 2% or less annually), we prefer the use of the term

“operational solutioning” or “operational solution mining” rather than just “mining” as it infers active mining. Generally speaking, the organization and clarity of the matrix is lacking in that it is difficult to follow and understand. Finger Lakes should rework the matrix to clarify its proposal.

***Finger Lakes Response:*** *A revised Cavern Matrix showing cavern volumes and salt tonnage extracted or to be extracted is attached as **Exhibit G** in response to DEC’s comments. An explanation of how the volumes for well 58 were derived is included in response to DEC Comment 2 above.*

**DEC Comment 6.** For each well including proposed Well FL1, provide maximum storage pressure at the wellhead (psig).

***Finger Lakes Response:*** *The maximum storage pressures at the wellhead for each well shall not exceed 1300 psig during injection, storage or withdrawal of LPG.*

### **DEC Comments on Well Status and Condition Report**

The following issues remain and must be addressed concerning Finger Lakes’ Well Status and Condition Report:

**DEC Comment 1.** Page 4 of Finger Lakes’ May 14, 2010 Reservoir Suitability Report states that “Well 33 pressure was not affected when pressure was bled to 0 psig on wells 34, 43, 44.” If communication exists between the wells as represented by Finger Lakes’ proposal to operate Gallery 1 (Well Nos. 33, 34, 43, 44 and new well FL1) as a single storage reservoir, why didn’t Well No. 33 respond when pressure was bled to zero on the other wells in the gallery?

***Finger Lakes Response:*** *Since the connection is through the rubble pile, it takes higher pressure to see the connection before a response is seen.*

**DEC Comment 2.** We acknowledge Finger Lakes provided copies of the “Micro Vertilog” and “Gamma Ray Segmented Bond Log” for Well Nos. 52 & 58, and references to the logging results are found in the May 14, 2010 application. Nevertheless, for each evaluation log run (except sonar surveys) and as a supplement to Exhibits 9 & 10 of Finger Lakes’ May 14, 2010 Reservoir Suitability Report, please consolidate logging results and provide a narrative analysis explaining the results of each log on a well-by-well basis with particular attention to cement bonding across the Camillus Shale. For each well, please include the corresponding depths of the Camillus Shale in the narrative. Additionally, provide copies of evaluation logs run on Well Nos. 33, 34, 43 & 44.

***Finger Lakes Response:*** *Segmented Bond Logs and Microvertilogs for Gallery 1 wells are attached as **Exhibit H**. The table below summarizes the interpretation of the Cement Bond Logs run on wells 33, 44, 52 and 58. This information is based on data and evaluations (included in **Exhibit H**) provided by log analysts from Baker Hughes and Schlumberger logging companies.*

Well Number	Base Camillus	Top Camillus	Logging Date	Excellent Bond	Good Bond
33	[REDACTED]	[REDACTED]	1/26/09	2,000'-500'	500'-Surf.
44	[REDACTED]	[REDACTED]	1/26/09	2,200'-740'	
52	[REDACTED]	[REDACTED]	10/12/72	2,696'-1,730'	1,730-950'
			11/14/09	2,675'-1,180'	
58	[REDACTED]	[REDACTED]	10/14/09	[REDACTED]	

*In all of the well logs summarized above the cement bond over the Camillus shale is rated to be excellent. The excellent bond in all cases extends high enough to cover the Bertie dolomite and in some cases it extends to within 500 feet of the surface. Based on this data these wells are in excellent condition and they were properly cemented.*

**DEC Comment 3.** We understand Finger Lakes plans to P&A Well No 34. We also are aware that Finger Lakes recently installed a new fully cemented 8 <sup>5</sup>/<sub>8</sub>" casing string in Well No. 33, a new fully cemented 4" string in Well No. 43 and a new fully cemented 6 <sup>5</sup>/<sub>8</sub>" in Well No. 44. Explain why Well No. 58 does not need to be relined – if applicable, Finger Lakes may refer to its reply to Item 2 above. Further, it is the Department's understanding that no evaluation and base logs (i.e., casing evaluation, cement bond log) were performed on the wells reworked with new casing strings which were cemented into place. Evaluation and base logs of these wells and new well FL1 along with a narrative analysis on each log will be required prior to the injection of LPG as a condition of any tentative storage permit.

**Finger Lakes Response:** Finger Lakes requested that Baker Hughes review the logs prepared as a result of the 1992 and 2009 drilling activities for well 58 for the purpose of determining whether the well needs to be re-lined and regarding the integrity of the cement bond. Baker Hughes' opinion is that the [REDACTED] and that the [REDACTED] and that there is [REDACTED] Attached as **Exhibit I** is the 1992 Cement Bond Log for well 58 (the 2009 segmented bond log was previously provided) and Baker Hughes' evaluations for well 58.

Evaluation of Gallery 1 logging that occurred in 2009 is provided in response to Comment 2 above.

Prior to injection of LPG, Finger Lakes will provide an evaluation of logging for new well FL 1, as requested, as well as an evaluation of cement bond logs of 33, 43 and 44, which are in the process of being relined. These evaluations will be submitted to the DEC in the near future.

## **EXHIBITS TO RESPONSE TO NOIA**

- Exhibit A – Revised Gallery Map
- Exhibit B – Plugging Reports and Salt Production Records
- Exhibit C – Revised Finite Element Analysis
- Exhibit D – Revised Vertical Cross-Section B-B' (South-North)
- Exhibit E – Revised Structural Cross-Section A-A' and B-B'
- Exhibit F – Revised Vertical Cross-Section A-A' (West-East)
- Exhibit G – Revised Cavern Matrix
- Exhibit H – Segmented Bond Well Log and Microvertilogs for Gallery 1 Wells and Baker Hughes Evaluations
- Exhibit I – Baker Hughes Evaluations of Well 58 Cement Bond and Casing